

## Collecting water samples remotely... Vapor Port Probe

*The Vapor Port Probe remotely collects soil gas samples and identifies the presence of volatile contaminants in the vadose zone. It is one of several probes at the INEEL inserted directly into contaminated wastes to monitor, sample and detect environmental conditions. The data it provides, combined with other probe data, can significantly influence environmental investigations and impact cleanup decisions.*



PN01-511-2-30

*The Vapor Port Probe can be easily inserted into a waste zone for vertical vapor gas profiling.*



PN01-357-3-9

### **Why the need for this probe**

INEEL needed to locate and characterize volatile contaminants surrounding buried waste, and to track changes in the amount of contaminants detected.

### **What the probe does**

The Vapor Port Probe collects samples of subsurface gases and vapors through filtered openings. Pressurized transfer lines remotely move the gases and vapors from the sample chamber to lines connected to a sample collection system on the land surface. There, the samples are safely retrieved and either analyzed in-situ or prepared for transport to an analytical laboratory.

### **Probe and operation description**

This probe is designed to collect vapor samples in unsaturated conditions, while preventing any uncontaminated pathways for contaminants to reach the land surface.

The probe was adapted for insertion into the ground using the INEEL's ResonantSonic™ drill rig. It can be driven into the ground to the point of refusal. In the case of the INEEL, the depth is about 25 feet. Once in place, the probe is not removed. After installation, probe connections are capped-off inside a protective box at the land surface, where vapor sample ports can be easily accessed at any time. The probe characterizes the extent of contaminants in waste disposal areas and verifies mathematical models used to calculate the transport of contaminants in the vadose zone.

The registered name for this technology is the Conesipper®, and it is available through Applied Research Associates (ARA)/VERTEK.

The probe consists of a long cylindrical section with vapor ports and filters located just above the probe tip. Two layers of filters surround the vapor ports to prevent soil particles from entering the probe's sample chamber.

The outer filter is a 254-micron stainless steel perforated cylinder and the inner filter is a 38-micron stainless steel screen located directly behind the probe tip. The filters allow gas and vapor flow directly to a small lower sample chamber, which is connected through a check valve to a larger upper sample chamber.

Two tubes connect the upper sample chamber to a sample glovebag at the land surface. One tube is used to apply vacuum to pull a vapor sample to the surface, and the other tube is used to apply positive pressure to purge the chambers.

Obtaining representative information on volatile and other contaminants in the unsaturated subsurface requires sampling at various locations and depths. The probe is generally placed where vapors from contaminants are likely to be found, for example:

- Just below the overburden and waste interface.
- Near the middle of waste zone, or close to a source of contamination.
- Just above the waste and underburden interface.
- At a location just above perched water that may be present



### **Retrieving and analyzing samples**

There are several methods of retrieving gas and vapor samples from the probe. They can be taken manually using a portable vacuum pump, through a protective sample glovebag, or using programmed air samplers, moisture traps and molecular sieves permanently installed under protective cover.

An INEEL-designed sample glovebag integrates well with the Vapor Port and Lysimeter probes that collect subsurface samples. It is designed to be highly portable and protective of sample integrity. It prevents the spread of contaminants contained in the samples, and protects workers and the environment by isolating contaminants during sample collection.

The method for analyzing samples depends on the contaminants. For example, portable gas analyzers can be used in the field to identify some volatile organic compounds, while sample collection and laboratory analysis is appropriate for other contaminants.

### **Data results**

The results from analyzed samples provide information regarding contaminants that are present in gases or vapors, their locations and their concentrations.



**Gas and vapor samples are transferred from the Vapor Port Probe into a glovebag where samples can be collected and analyzed.**

### **Benefits**

Subsurface data obtained as a result of using the Vapor probe include these benefits:

- Determines whether volatile materials and gases are contaminating soil
- Identifies the contaminants
- Indicates increases and decreases in contaminant migration over time
- Reduces uncertainty in risk assessment calculations that influence decisions
- Reduces worker exposure to contaminated samples
- Avoids environmental harm with minimal intrusion
- Helps validate the accuracy of disposal records and field data.

### **Points of contact**

To discuss how the Vapor Port Probe might apply to your needs, contact **Andy Baumer**, or one of the other references at the phone or e-mail address shown. The INEEL's *Technology Catalog* is another reference on new and innovative technologies. It's on the web at [tech.inel.gov](http://tech.inel.gov).

### **Project Manager**

**Andy Baumer**

INEEL Environmental Restoration Program  
(208) 526-3238  
[baumar@inel.gov](mailto:baumar@inel.gov)

### **Design Lead**

**Danny Anderson**

INEEL Project Engineering  
(208) 526-0863  
[andedl@inel.gov](mailto:andedl@inel.gov)

### **Technology Coordination**

**Brandt Meagher**

INEEL Environmental Technology & Engineering  
(208) 526-9767  
[zbm@inel.gov](mailto:zbm@inel.gov)

### **INEEL Subsurface Science Initiative**

**Michael Wright, Director**

INEEL Subsurface Science Initiative  
(208) 526-3315  
[wrigpm@inel.gov](mailto:wrigpm@inel.gov)